APPM 4360/5360 Introduction to Complex Variables and Applications

HOMEWORK #4

Assigned: Monday February 18, 2019

DUE: At class Monday March 4, 2019

XC: Extra Credit

1.Evaluate the integral $\oint_C f(z)dz$ where C is the unit circle (circle centered at the origin, unit radius) enclosing the origin, where $f(z)$ is given by:

a) $\log(z+2)$ b) $1/(z^2+1/4)$

You may use power series representations in problems 2 & 3.

2. Evaluate the integral $\oint_C f(z)dz$ where C is the unit circle enclosing the origin, where $f(z)$ is given below

a) $f(z) = e^{iz}/z$ b) $f(z) = (\cos z - 1)/z^3$

3. Solve: 2.6.2 b, c

4. Solve: 2.6.7

5. Discuss whether the sequence $\{1/(nz)^2\}_{n=1}^{\infty}$ converges and whether the convergence is uniform for: $0 < \alpha < |z| < 1$. Discuss whether the convergence is uniform if $\alpha = 0$

6. Use the set up of problem 3.1.5 for:

a) $\sum_{n=1}^{\infty} z^{2n}, 0 \leq |z| < R < 1$; b) $\sum_{n=1}^{\infty} e^{-2nz}, R < \text{Re}z < 1$

7. Find the radius of convergence of the series $\sum_0^{\infty} a_n(z)$ where $a_n(z)$ is given by

a) $(-z^2)^n$ b) $n^{2n}z^{4n}$

8. Solve 3.2.2 b, d, f

9. Solve 3.2.7

10. Find a series representation for $1/(1+z^2)$ for $|z| > 1$ (Hint: see the discussion and hint of problem 3.2.8)

XC: Solve 2.6.10a,b